Claims

1. A vaccine for the treatment of disease caused by pathogenic *Neisseria*, the vaccine comprising an immunogenic component based on the inner core of a *Neisseria* lipopolysaccharide, LPS, and being capable of eliciting functional antibodies against a majority of the strains within the species of the pathogenic *Neisseria*.

2. A vaccine according to claim 1, wherein the said immunogenic component is capable of eliciting functional antibodies against at least 60% of the strains within the species of the pathogenic *Neisseria*.

3. A vaccine according to claim 2, wherein the said immunogenic component is capable of eliciting functional antibodies against at least 70% of the strains within the species of the pathogenic *Neisseria*.

4. A vaccine according to any preceding claim, wherein the immunogenic component is substantially free from outer core lipopolysaccharide.

5. A vaccine according to any preceding claim, wherein the species of the pathogenic *Neisseria* is *Neisseria meningitidis*.

6. A vaccine according to claim 5, wherein the antibodies are elicited by the immunogenic component in at least 50 % of group B strains of *Neisseria meningitidis*.

7. A vaccine according to claim 5, wherein the antibodies are elicited by the immunogenic component in at least 60% of group B strains of *Neisseria meningitidis*.

8. A vaccine according to claim 5, wherein the antibodies are elicited by the immunogenic component in at least 70% of group B strains of *Neisseria meningitidis*.

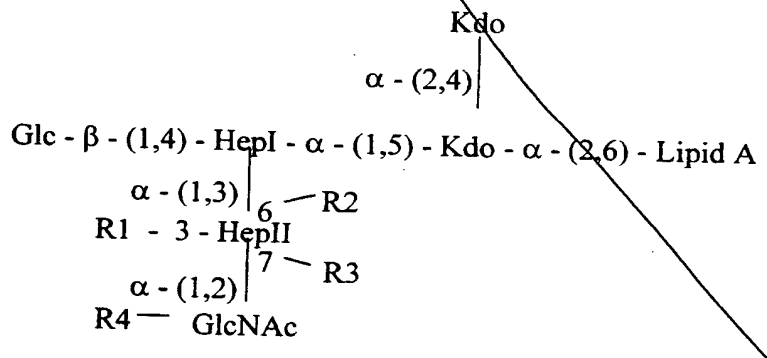
9. A vaccine according to any preceding claim, wherein the immunogenic component comprises of or consists of an epitope which is a part or all of the inner core structure of a *Neisseria* LPS, is derived from this inner core, is a synthetic version of the inner core, or is a functional equivalent thereof.

10. A vaccine according to any preceding claim, wherein the immunogenic component is an epitope on the LPS inner core characterised by the presence of a phosphoethanolamine moiety linked to the 3-position at HepII of the inner core, or is a functional equivalent thereof.

11. A vaccine according to any preceding claim, wherein the immunogenic component is an epitope on the LPS inner core which comprises a glucose residue at HepI.

12. A vaccine according to any preceding claim, wherein the immunogenic component is an epitope on the LPS inner core which comprises an N-acetyl glucosamine at HepII of the inner core LPS.

13. A vaccine according to any preceding claim, wherein the inner core LPS consists of an inner core oligosaccharide attached to lipid A, with the general formula as shown:



where R1 is a substituent at the 3-position of HepII, and is hydrogen or Glc-α-(1, or phosphoethanolamine; R2 is a substituent at the 6-position of HepII, and is hydrogen or phosphoethanolamine; R3 is a substituent at the 7-position of HepII, and is hydrogen or

phosphoethanolamine, and R4 is acetyl or hydrogen at the 3-position, 4-position or 6-position of the GlcNAc residue, or any combination thereof; and where Glc is D-glucopyranose; Kdo is 3-deoxy-D-*manno*-2-octulosonic acid; Hep is L-*glycero*-D-*manno*-heptose, and GlcNAc is 2-acetamido-2-deoxy-D-glucopyranose.

SUB A6 cont'd

14. A vaccine according to any preceding claim, wherein the immunogenic component is reactive with the B5 antibody produced by the hybridoma deposited under accession number IDAC 260900-1.

15. A vaccine comprising a few immunogenic components based on the inner core of a *Neisseria* lipopolysaccharide, LPS, and being capable of eliciting functional antibodies against a majority of the strains within the species of the pathogenic *Neisseria*.

16. A vaccine according to claim 15 and including an immunogenic component as defined in any of claims 1 to 14.

SUB A7

17. A vaccine according to claim 15 or 16, wherein the said few immunogenic components elicit functional antibodies in at least 85% of the strains within the species of the pathogenic *Neisseria*.

18. A vaccine according to claim 17, wherein the said few immunogenic components elicit functional antibodies in at least 95% of the strains within the species of the pathogenic *Neisseria*.

SUB A8

19. A vaccine according to any of claims 15 to 18, wherein an immunogenic component is reactive with the A4 antibody produced by the hybridoma deposited under accession number IDAC 260900-2.

20. A vaccine according to any preceding claim, wherein the immunogenic element of the vaccine is an epitope accessible on the bacterium in the presence of bacterial capsule.

Sub A8 cont'd

21. A vaccine according to any preceding claim, comprising one or more immunogen components which are capable of stimulating antibodies which are opsonic.

22. A vaccine according to any preceding claim for the treatment of *Neisseria meningitidis*.

23. A vaccine according to claim 22 for the treatment of *Neisseria meningitidis* group B.

24. A vaccine according to any preceding claim for the prevention of meningitis, septicaemia or pneumonia or other manifestation of systemic or local disease occasioned by *Neisseria meningitidis*.

Sub A9

25. A vaccine according to any of claims 1 to 22 for the treatment of urethritis, salpingitis, cervicitis, proctitis, pharyngitis, pelvic inflammatory disease or other manifestation of systemic or local disease occasioned by *Neisseria gonorrhoeae*.

26. A vaccine according to any preceding claim which is a conjugated vaccine.

27. A vaccine according to any preceding claim, which is derived from a commensal *Neisseria*.

28. A vaccine according to claim 27, wherein the commensal *Neisseria* is *Neisseria lactamica*.

29. An antibody reactive with an immunogenic component as defined in any preceding claim.

30. An antibody according to claim 29, wherein the antibody is humanized or otherwise customised to enhance suitability for administration to a human.

31. An antibody according to claim 29, obtainable from the hybridoma producing antibody B5.

32. An antibody according to claim 29, obtainable from the hybridoma producing antibody A4.

33. A hybridoma producing antibody B5.

34. A hybridoma producing antibody A4.

35. A pharmaceutical preparation comprising an antibody according to any of claims 29 to 32 in combination with a pharmaceutically acceptable carrier.

SUB A1D

36. A method for the treatment of *Neisseria* infection, the method comprising administering to a subject in need of such treatment an effective amount of a vaccine according to any of claim 1 to 28.

37. A method for the treatment of *Neisseria* infection, the method comprising administering to a subject in need of such treatment an effective amount of an antibody according to any of claims 28 to 31.

38. A method for the identification of immunogenic epitopes of strains of a species of *Neisseria*, the method comprising the steps of generating antibodies to the inner core of a *Neisseria* bacterium, by inoculation of a host organism with a *galE* mutant strain of *Neisseria meningitidis*, and testing such antibodies against a wild type *Neisseria meningitidis* strain to identify those antibodies which are reactive, and for which the epitopes are therefore accessible.

39. Use of one or more biosynthetic pathway genes in the production of a *Neisseria* strain for the assessment, treatment or prevention of *Neisseria* infection.

40. Use of an immunogenic component, or a few immunogenic components, based on the inner core of a *Neisseria* lipopolysaccharide, LPS, and being capable of eliciting

functional antibodies against a majority of the strains within the species of the pathogenic *Neisseria*, in the preparation of a medicament for the treatment of a disease caused by a pathogenic *Neisseria* infection.

41. Use of an antibody according to any of claims 29 to 32 in the preparation of a medicament for the treatment of *Neisseria* infection.